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ABSTRACT

Intended to assist others wishing to adapt the Arizona model, this guide describes the processes of the Summer Technical Institute Project. Chapter 1 is an introduction to the Summer Technical Institutes, career exploration programs directed primarily at young women in their early teens. Chapter 2 is a literature review conducted to ascertain if technical careers offer sufficient potential for women in terms of salary and job growth, to determine what factors cause young women neither to pursue nor persist in nontraditional careers, and to determine which age groups would most likely be positively affected by intervention programs. The model Technical Institute curriculum is presented in Chapter 3. It discusses selection and maintenance of the advisory committee as well as the instructional units (computer awareness, career decisions, and production processes), goals, and outcomes. Other topics include socialization and belonging, evaluation, facilities, criteria for attendance, and time frame. Chapter 4 describes implementation features of the Institutes. It covers marketing for student support; organizational solicitation; marketing for student participation aimed at school counselors, administrators, teachers, and parents and students; instructional support; counselor selection; teacher selection; volunteer community participants; scheduling; and health and safety issues. Appendixes include the program design and activity schedule. (YLB)

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EXPANDING OPTIONS IN TECHNOLOGY

AN ARIZONA VOCATIONAL EQUITY MODEL

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EXPANDING OPTIONS IN TECHNOLOGY

An Arizona Vocational Education Equity Model

BY

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September 1986

FOREWORD

Research indicates young females are diminishing their career options by their choices of courses in school. Insufficient early experiences and knowledge in math, science and technical vocational education exclude women from many technical careers. Societal factors also impact females' desire to pursue nontraditional careers such as those grounded in technology. For these reasons, a technical institute for young women was devised as a means of increasing motivation, interest and achievement of females towards careers in technology.

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With any effort of this magnitude, the assistance of many is required. I wish to make special mention of Debbie Spickerman who assisted me in every facet of program development and the production of this document. The project's advisory council was especially committed to the Summer Technical Institutes. Representing business and agencies in northern Arizona, they gave untiringly of their time and expertise. Each council member advised throughout the program design phase and later served as presentors during the implementation of the Institute. Their evaluation of the Institute was critical to the development of this model. A complete listing of those advising the program follows:

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- Mack Corporation

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EXECUTIVE SUMMARY

The Summer Technical Institute Project was funded by the Arizona Department of Education to encourage sex equity in vocational education in Arizona. The project was designed to:

1. Encourage young women to expand their horizons and consider technical careers.
2. Provide structured activities which will promote success and develop confidence in personal abilities.
3. Provide an opportunity for females to interact with successful role models.
4. Provide women with support and encouragement to plan nontraditional careers, especially technical careers.
5. Give young women the opportunity to successfully apply math concepts in technology.

The project progressed through several developmental phases. First, a literature review was conducted to determine characteristics of the target population that might be addressed in the program design. Next, the pilot program was developed, complete with units of instruction and instructional activities. Subsequently, implementation features were instituted, such as marketing, instructional support and scheduling. A report of these facets of program design may be found in chapters 3 and 4 of this document.

Two pilot Summer Technical Institutes were conducted, during June of 1986. To achieve the objectives of the project, the instructional component was divided into three major elements: (1) Computer Awareness, (2). Career Decisions, and (3) Production Processes. Applications of science and math were incorporated in the production processes unit. Another aspect of the Institutes' design dealt with the need of the participants for socialization and belonging during their week's stay away from home. Each of these facets are explained in the model section of this publication.

This document represents the last phase of the project. EXPANDING OPTIONS IN TECHNOLOGY is a product culminating from prior phases of program development. It incorporates the evaluations and ideas of students, business participants, advisory members, and the instructional staff. The processes described here are meant only as a guide to assist others wishing to adapt this Arizona model to their own particular environment.

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CHAPTER 1

INTRODUCTION

Women constitute 50% of the workforce today. Nearly 70% of this female population is concentrated in three low paying occupational groups. Women will work an average of twenty-five years during a lifetime; yet they will need seventeen years of schooling to equal the pay of a man with an eighth grade education (Kolde, 1985).

A recent 1985 issue of U.S. News and World Report focuses on jobs of the future and the impact of technology. While reporting only an 11% increase in employment in high technology industries through 1995, the article suggests that the statistics underestimate the pervasive impact technology will have on the workplace. All types of companies, from manufacturing concerns to service industries, will become more reliant upon computers and electronics in efforts to curb costs and boost profits.

For the contemporary woman to become part of this changing economy, alterations in social and personal career perceptions must be made. From an educational perspective, women will have to be prepared to enter technical fields, long considered nontraditional for their gender.

Summer Technical Institutes in Arizona were designed to expand the career options of young women specifically in the fields of technology. To facilitate the program design, a review of the literature was conducted to determine what factors cause women to choose low paying traditional careers rather than higher paying nontraditional ones such as those in technology.

The purposes of the literature review study were: 1) to ascertain if technical careers offer sufficient potential for women in terms of salary and job growth; 2) to determine what factors cause young women to neither pursue nor persist in vocational education, science, and math courses that could prepare them for technical careers; and (3) to determine which age groups would most likely be positively impacted by exposure to a summer technical institute.

Literature relating to this subject is discussed in the next chapter. The model Technical Institute curriculum is presented in Chapter 3. Chapter 4 describes implementation features of the Institutes. Supplementary information outlining the curriculum design may be found in the Appendix of this publication.

CHAPTER 2

RELATED LITERATURE

Although there are more women in the workforce than ever before, the increase in single parent families has contributed to the feminization of poverty. Because jobs have historically been separated by sex and because females have been paid less for work equivalent to jobs of men, activists have sought to address the issue of comparable worth. As this effort has become hopelessly bogged down in the courts, it has become evident that women wishing salary equity will have to be prepared to enter those occupations long held by men.

High Technology, A Potential Solution

Educational program planners have identified high technology as a likely target for penetration by females. First, it is a new field and the "old boy" network has not been firmly established. Second, the future appears bright: the Bureau of Labor Statistics forecasts that high technology industries will generate 1.7 million jobs by 1995 (U.S. News & World Report, 1985).

While high technology industries will account for a small proportion of all new jobs, high technology will soon permeate the majority of old-line businesses. "It is not so much that jobs will become 'high tech' but that technology will alter how they are performed and the technical knowledge needed by workers to perform them" (Employment Policies: Looking to the Year 2000, 1986, p. 3).

High technology also offers rewarding salary possibilities. A review of a Michigan State Placement Services study conducted in 1984-85 found beginning salaries of four year graduates in technical fields to be in the range of $20,000 to above $28,000. So it appears high technology offers females both job security and financial potential.

Factors of Nonparticipation

Even at a time when a future in technology offers great rewards, women are not entering technical careers in proportion to their numbers. In fields of engineering, women constitute less than 5% of the practicing engineers (Campbell, 1986). In 1984 females accounted for only 16% of the enrollment in engineering colleges. By 1985, enrollment was down an alarming 3.1% (Electronic Engineering Times, 1985). Females are also absent in related fields such as science. Campbell found that of the nation's 2.7 million scientists, only 5% are female.

Why have women not pursued or persisted in most technical fields? "Lack of technical know-how is what seems to be keeping more women from making a go of high-tech ventures," according to a report in Working Women (1985, p. 37). Equally important has been a math and science deficency by females. "Women have been significantly missing from our math (and science) classes, and have thus been denied access to many relatively well-paying and prestigeous fields of work" (Moody, 1986, p. 1).

But math and science are not the only courses of study in which females are reluctant to enroll. Those vocational education courses that traditionally have high male enrollments remain that way for the most part. In the prevocational studies, such as Industrial Arts, females constituted only 10.2% of the total enrollment in Arizona during the 1984 school year. While in Trade and Industrial Education, young women made up only 15.5% of the population (Arizona Department of Education, 1985). Vocational choices reflect tradition learned fr n sex-role conditioning in early childhood, which may account for this phenonmenon (Garfield-Scott and LeMahieu, 1984).

Truxal, a science educator, states that seeing the applications of science and math in vocational education makes those subjects exciting and interesting (1984). Young women are given few opportunities to apply the academics or to manipulate certain kinds of materials, such as those found in Trade and Industrial Education. Consequently, they are being denied an opportunity to learn and experience a variety of cognitive styles in the same ways as young males.

Noting the Differences by Sex

Researchers studying the socialization of young females have noted sex differences and possible causes for those differences. Patricia Campbell (1986) summarized the findings of differences in math achievement. She concluded from studies of standardized achievement test scores that:

* In the elementary years, similarities between the sexes in math achievement are found more frequently than differences. When sex differences are found, they tend to favor girls.

* In the junior high school years, approximately half of the few sex differences found in mathematics favor girls.

* In high school and beyond, the many sex differences found in mathematics achievement favor boys (p. 516).

In Dugger's 1986 review of the research, he discusses the physical domain and notes that girls have been deprived of experiences with manipulative materials, factors that are critical to sequential growth in spatial visualization skills. Such skills are in turn essential to development of thinking processes used in math-dominant, technical fields of study.

Dugger also notes the social factors that impact nonpersistence of females in math. "Girls enrolled in public schools selected subjects viewed as 'masculine'... less often than males, in spite of equal abilities" (1986, p. 4). Armstrong (1981) also found that students considered the usefulness of subjects in determining whether to continue study of a subject matter. Girls perceived math to be of less value and therefore elected not to continue studying it.

Each of these factors has implications for designers of sex equity programs for girls. If nontraditional subjects are to be studied by young women, they will need to be acceptable for that population. The immediate future relevance of the material must also be understood.

Patricia Campbell also notes from her years of research on the subject of females and math that, "At this point there is no evidence that the differences in math and science have a genetic or biological basis. There is, however, a great deal of evidence that different treatment of groups of students and different expectations about math and science achievement can and do have an impact on achievement" (p. 517).

Research reveals several aspects of the role of socialization in sex stereotyping. Parent expectations play a major role in the development of a child's self-concept. Teachers, too, unwittingly contribute to the lack of persistence by females in certain courses of study because of the way in which they relate to female students. At times, teachers have different expectations for girls than they do for boys. Negative feedback from teachers to their female students is interpreted differently by the boys than girls.

> Believing in one's ability, regardless of failure feedback, may help explain why boys, who tend to be at a disadvantage compared to girls in elementary and junior high school, perform better than girls in later years. They see the cause of failure as something than can readily be changed--namely, not enough effort--while girls tend to explain failure in terms of ability, a factor that is much more difficult to change (Dweck and Bush, 1976 p. 155).

Different treatment and expectations can occur when instructors and role models for nontraditional studies such as vocational education, math and science, are all male. Much research has been conducted on the effects of modeling. Bandura and Walters state "...models play a part in shaping behavior and in modifying social norms and thus exert a strong influence on the behavior of children and adolescents" (1963 p. 49). Providing appropriate modeling has a significant potential for effecting social change in females' perceptions of what courses of study and careers are viewed as acceptable.

Determining Time for Intervention

Which age groups will then be most likely positively impacted by exposure to intervention programs such as a summer technical institute? If no significant differences in the performance of males and females can be noted in the elementary grades in math and science, small differences in the junior high years, but wide variations are observable by the senior year, one must conclude that some factor or factors were present during those years to create the differences.

Differences in the achievement in math and science of sex groups occur partly because of patterns of course taking (Moore and Smith, 1983). As might be expected, when one student takes a math or prevocational course and another does not, the first student's knowledge in the skill area will be greater. For females to succeed in male-dominated fields, they must have the preparatory course work, including prevocational courses such as Industrial Arts.

Differences in achievement are being noted at age thirteen, just the time when students are for the first time selecting their curricula. During this period, any success or interest by girls in math and technical areas of study should be reinforced (Packard, 1986). Intervention after that time, while having the potential to change future patterns, may be too late to create certain building blocks of learning essential to intellectual development.

Conclusion

To address the personal and social dilemma caused by the disparity in job opportunity and job preparation between males and females, programs designed to encourage motivation and performance of young females in nontraditional academic and vocational courses is recommended. Obviously, the earlier the intervention the greater the potential to impact patterns of course taking. By delaying intercession, girls may simply opt out of a future in technology or other nontraditional careers because of an inadequate learning base for such studies.

Technical careers offer potential for women in terms of income growth and job availability. Planners recognizing the many societal influences that serve as barriers for the entrance of females into such nontraditional careers, may be able to open opportunities for them. An atmosphere that promotes success can be created by providing opportunities for girls to interact with noteworthy role models, by providing them with structured hands-on technical experiences, and by providing them the opportunity to apply math and science. These planned experiences could give young women inner resources to take charge of their own destiny by expanding their options through technology.

CHAPTER 3

EXPANDING OPTIONS IN TECHNOLOGY

Summer Technical Institutes for Young Women was a career exploration program directed primarily at young women in their early teens. The aim of the program design was to expand options of females by stimulating interest and creating motivation to continue studies that might lead to technical careers. To accomplish this, students were provided a wide range of experiences and opportunities to explore technology in laboratory and business settings.

Selecting and Maintaining an Advisory Committee

To replicate this model, the first step is the establishment of an advisory committee. This group of individuals should be representative of a broad cross-section of the community, and be able to offer expertise to the project.

To ensure wide support of your program, you may wish to select persons who live in other parts of the state. However, you may wish to select skilled individuals from your community if they are available. This will contribute to cohesiveness of the group, as people tend to be very busy and difficult to get together in one place at the same time.

Once chosen, committee members should share in the decisions, responsibilities and the outcomes of the Institutes. They will determine the goals and objectives and set the tone and direction for the Institutes. They can also serve an active role as instructional support during the Institutes.

This project was written to comply with the stated purposes (see the Executive Summary) of the project. The advisory committee to this project used these purposes to identify elements of instruction for the Institutes. Following are the instructional units, goals, and outcomes formulated by the advisory committee.

Instructional Components

The three major units of the program design included: (1) Computer Awareness, (2) Career Decisions, and (3) Production Processes. Applications of science and math were incorporated in the production processes unit.

The Computer Awareness unit in the pilot was taught as a means of learning and applying technology. A computer laboratory provided a hands-on environment for young women to problem solve in a logical and sequential manner. Applications of computer technology were illustrated through field trips to an engineering college, industry sites and agencies. Examples of demonstrations during the pilot were: flight simulations, computer assisted design, computer production processes, and practical aspects of computer programming. Applications also included mapping of the planets, and a design of electrical circuits that advanced an elevator from floor to floor and that regulated traffic lights.

The Career Decisions unit encompassed self-assessment, values/role clarification, interest inventories, and career decision-making processes. Introduction to jobs, skills, and concepts requisite to a wide range of technical studies were provided through field trips to business, industry, and agencies. The acceptability of technical careers was reinforced by many successful women from industry who served as supplementary instructors and as role models.

The unit on production processes served several useful purposes. Basic elements of science, physics, mathematics, electronics, and manufacturing could be taught in a practical, hands-on type environment. A daily laboratory provided basic soldering and radio assembly for the electronics activity. Mechanical and medical products production were also introduced in the laboratory, in the field, and in the classroom setting through the use of demonstrations and presentations by industry leaders.

A complete outline of the units of instruction, the knowledge required, and the supporting instructional activities may be found in Appendix A. An example of a schedule of suggested daily activities is included in Appendix B.

Goals-

The goals of the Institutes as determined by the advisory committee to the project were to:

1. Motivate young women to engage in studies that lead to technical careers.

2. Provide young women with a means for developing and utilizing mentor support groups and systems.

3. Create an awareness of the importance of continued math and science to the pursuit of technical careers.

4. Give young women basic knowledge of career planning to enable them to continue decision-making as a life-time process.

5. Familiarize young women with basic computer applications as they relate to technology.

6. Create an environment for developing the basic skills of communications, problem solving, social skills, and thinking skills.

7. Introduce vocational laboratory experiences which integrate academic and applied learning.

Outcomes-

The outcomes as determined by the advisory committee to the project are listed for each of the three units of instruction below:

Career Decisions:

a. Given evaluation and assessment instruments, the women will complete a self-assessment of values, interests and skills as evidenced by the completed instruments.

b. Given a list of technical careers, students will be able to identify technical jobs according to education and professional levels as evidenced by the list.

c. Through the use of female role models and video productions, students will value problems of sex role stereotyping and social barriers to nontraditional careers, as evidenced by oral responses and questions arising during open discussions.

d. Given information on support and mentoring needed to pursue nontraditional careers, students will be able to identify means of getting support as evidenced by the ability to verbalize those support avenues. (Evaluation will be by teacher observation.)

e. Given a variety of career decision materials in a classroom setting, students will be able to seek and secure career information and make career decisions as evidenced by written documentation of those decisions.

f. Given information about education and training, students will be able to identify skills possessed, training needed and institutions capable of providing education and training as evidenced by a printout from a computerized Career Information System listing or other written documentation.

Production Processes

a. Given tours of industry, demonstrations, presentations, video productions, and hands-on projects, the student will conceptualize production to include people and processes, as evidenced by a pictorial (graph, chart, etc) presentation of these concepts.

b. Given technical projects entailing problem solving, the student will identify and apply principles of science and math to the satisfaction of the teacher.

c. Given hands-on job tasks to complete, presentations by industry specialists, and tours of industry sites, the student will be able to determine types of jobs and the skills required of those jobs, as evidenced by notations by the teacher.

d. Given the opportunity to use and observe various forms of communication to include technical writing, oral communication, designs, etc., the student will be able to relate means of comunication used in technical industries, to the satisfaction of the teacher.

Computer Awareness in Technology:

a. Given IBM PC's, the student will write programs and solve problems in Basic computer language as evidenced by printouts of the programs.

   1. Students will develop solution designs for algorithms.

   2. Students will learn keyboarding/typing skills.

   3. Students will read and follow flow charts.

b. Given opportunities to see and hear about occupations using computers in agencies and industry, students will be able to identify a variety of jobs using computer technology, as evidenced by oral summaries of those learning experiences.

c. Given opportunities to see demonstrations of computer programming and design, students will develop an awareness of the engineering and designing phases of production as it relates to computers, as evidenced by summary discussions of those presentations.

General Outcomes of the Institutes-

Given all of the learning activities for the week, the students will pursue courses of study that lead to technical careers as evidenced by enrollment in those courses over the next two years.

Socialization and Belonging

Of equal value to the instructional activities was a happy and secure social environment. The literature review had revealed the importance of the socialization process to the career and curriculum decisions of girls. In order to break the barriers and pursue nontraditional careers, these young women needed the support of the mentor/role models who were provided in every facet of the program day and the support of their own group.

To promote a feeling among the participants that they belonged to a team that was supportive, a variety of recreational and social times was planned. These events were meant to cause a bonding of the group. Some of these activities were barbecues, hikes in the woods, games, shopping outings, swimming, and a trip to Oak Creek Canyon. Evening get-togethers each night with refreshments, while fun, also served as a time to bring closure to the day's activities. These discussion times provided students an opportunity to also think about the next day's schedule and to plan what was coming next.

Evaluation

Skills of the students were assessed in the pilot Institute at the conclusion of the computer laboratory. Students were asked to complete a series of activities that had been introduced during the week. This was followed by a discussion of their responses. Successful completion of a working radio was evidence of learning performance for the electronics laboratory. The quality of the discussions surrounding career decisions was assessed by the instructors and counselors as a means of determining both the effectiveness of the teaching and the extent of learning that had been gained from each of the planned activities.

Two instruments were administered to evaluate the impact of the Institutes. One was given at the conclusion of the Institute week, the other, three months later, after students were back in their own environments. The first tool measured the effectiveness of instruction and the instructional program. It also served to provide valuable information about which social activities had been successful. A final questionnaire was conducted to determine any long term effects the Institute may have had on behaviors and thinking.

Facilities

Facilities needed for this model Institute are electronics and computer laboratories for technical hands-on instruction, and a comfortable classroom setting suitable for discussion and interaction in a career development component.

Access to the businesses, industry and agencies where technology is used is important to the learning of technical processes, products, and jobs. The availability of a career development office will also open avenues for self-discovery through use of those materials and resources.

Criteria for attendance

1. The Institute may be designed for twenty-five young women between the ages 13-17.

2. Successful mastery of Algebra I is a suggested prerequisite for the Institute.

3. Acceptance criteria might include a demonstrated aptitude for technical careers as indicated by standarized aptitude measures or through achievement in math, science or technical classes.

Time Frame

The suggested time frame for conducting the Institute is one full week during the summer which includes a dormitory living arrangement. Students arrive on a Sunday for check-in and orientation, progress through a series of planned learning activities during the week and finish their program on Saturday. This timeline provides parents the opportunity during nonwork hours to transport participants to the Institute site while providing Institute planners a full week to complete objectives. To offer more girls an opportunity to attend, conduct a series of workshops operating consecutively week after week. This provides continuity of personnel and program operation.

CHAPTER 4

MODEL IMPLEMENTATION FEATURES

Several practical aspects for implementing technical institutes are described in this section. First, the program must be marketed both for financial support and for potential enrollees. Next, instructional support must be determined. This will include making decisions on the selection of instructors, counselors, and role models. Then a complete schedule of the week's activities will need to be developed. Last of all, be certain that you and your institution are legally protected by addressing the safety and health concerns of participants and instructional support staff.

Marketing for Student Support

Two facets of marketing are presented. First, it may be necessary to charge a tuition fee to cover costs of the Institutes. When this becomes necessary, some students may be excluded from attending unless financial assistance is guaranteed. The first objective, then will be to generate participant scholarships from external organizations. The second marketing thrust will be to produce sufficient enrollment to the Institutes. A discussion of each of these marketing efforts follows.

Organizational Solicitation-

To be sure a balance of ethnic, racial, and socio-economic populations is created for the Institutes, it may be necessary to solicit financial support from external sources to cover the room and board and other incidental costs of underprivilaged participants. Several types of organizations might be approached. They include such agencies as Job Training Partnership Act (JTPA), the Urban League, Indian reservation departments of labor, and a host of others.

When working with agencies such as JTPA, contracts will be required. A description of the purposes of the project, daily activities, a summary of curriculum, vitae of instructional personnel, supervision requirements and so forth should be submitted in proposal form. In this way, an agency may contract for a number of participant spaces to the Institute. As such organizations have qualification standards for participants in their programs and some potential applicants may not qualify under the contracting agencies terms, ensure adequate numbers by creating a waiting list of applicants that can be contacted on short notice.

Other contacts for funding might include local service and professional organizations such as Soroptomist International (a professional women's organization), Kiwanis, Lions, local education associations, and engineering societies. There are an abundance of professional women's service and minority organizations willing to assist.

It is easier to ask for funds for a specific person; for example, someone who has already made an application but is in need of financial assistance. Appeals can then be directed to

fit the individual's situation. Organizations also prefer to donate to someone in their own locality. Once applications have been submitted, contact may be made in the following ways:

1. Call the teacher or counselor of the student to determine if school funds or school organizations might assist.

2. Ask the school contact for lists of local organizations who have in the past supported such student activities. Obtain the name and telephone number of a contact person.

3. Make an initial warmup call to the organizational contact. Tell them what you are requesting. At the same time, promote the need for such intervention programs for young women. Even if you are turned down at this point, you have an excellent opportunity to let the community at large know about the topic of occupational sex stereotyping.

4. If requested to do so, send a short program description along with a profile of the student for whom the request is being made. An overview of program goals and activities should be drafted early in your project. It then can be adapted over and over to fit the situation.

Establishing community rapport will open the door for your marketing effort. Providing a clear statement of purpose and benefits will also promote your idea.

Marketing for Student Participation

The first step in marketing the Institute to participants is to identify the target population. While the ultimate aim is to attract the attention of students, the primary marketing targets for this type of program are school counselors, administrators, teachers, and parents--who in turn market to the secondary population, students. Each of these groups require different selling techniques.

School Counselors-

There are an abundance of summer programs being offered to high school students by a variety of institutions. You will be competing with all of these programs and could even find competition within your own institution among programs. Eliminate confusion for students, parents, and counselors by ensuring that the title and content of the Institute do not appear similar to others being offered in your locality.

To be certain that your program's literature stands out from the hundreds received in the counselors' offices, brochures should be carefully designed for appeal and color. It would be well worth the dollars spent to engage a professional display artist to assist with this presentation.

Personal follow-up calls to school counselors should be made two weeks after program announcements have been mailed. This contact will call attention to the Technical Institute, while providing a means for enlisting counselor assistance with nominations of potential participants. Counselors generally know which students can qualify as well as those that will benefit from such an experience.

School Administrators-

Should the effort with school counselors not prove sufficient in a particular school, two other administrative avenues are open: the vocational director, and the vice-principal. While some schools may not have a director of vocational education, someone is usually the administrative contact person for that area. A telephone call to either individual could prove to be beneficial to your efforts. When making the contact, ask for a name of one person who would be assigned to your program in that particular school. Having this type of administrative clout behind the project will be a boon to the marketing of the Institute.

Teachers-

Teachers interested in their students' academic and vocational development during the summer are an excellent resource. Sending the brochure to the school, however, will not guarantee that it gets into teachers' hands. Other means must be found to inform them about the Institute. Individual contacts may be made at conferences, seminars, or other places where teachers congregate.

Parents and Students-

Parents and students can best be reached through school contacts such as teachers, counselors, administrators, or through the mass media. Radio, newspapers, and television are media to be utilized. Stressing the benefits of sex equity without offending conventional thinking on the topic will present the program in its best light.

Instructional Support

Probably the most critical decision you will make is the selection of the Institute counselors and instructors. The success of your Institute is in their hands. They not only create an atmosphere for purpose and direction, but also provide the nurturing and support crucial to an environment conducive to learning. By witnessing the counselors' and instructors' enthusiasm for math, science, and vocational skills, participants are likely to involve themselves more readily in the educational process.

Selecting the Right Counselors-

Counselors are the caregivers for the Institute. Characteristics of good counselors are:

* Being lovable and fun.

* Being directive while possessing the ability to enforce rules.

* Being reasonable and accommodating to individual and group concerns and wishes.

* Being conscientious and trustful.

* Capable of being a friend (easy to talk to).

* Being supportive, caring, helpful, and understanding.

Selecting counselors with the above affective characteristics will ensure a cheerful safe environment for participants. In addition, counselors will have duties to perform which will necessitate a knowledge of formal and informal career development. This might mean that they plan informal sessions with the girls in the evenings, such as get-togethers in the halls at night. It could mean counselors would be required to supervise completion of interest inventories, to organize sessions for values clarification or to deliver mini-workshops in such areas of study as nontraditional careers or career exploration.

The expertise described above would require selecting individuals with a background in sociology, psychology or a related field. Graduate students may be willing to accept minimum reimbursement for the opportunity to gain experience. They bring with them a certain degree of maturity, but will probably be young and vital enough to relate well and keep up with the intensive activities of high school age students.

Selecting Excellence In Instruction-

All instructors serve as models either negatively or positively. Obviously, the intent is to create positive influences for the young participants. Good modeling is created when there is a mutual respect between parties. The respect of the student for the instructor may be based upon the presence and appearance of the instructor. It will be enhanced by the instructor's obvious knowledge of the subject matter and the ability to impart that knowledge in a way that is meaningful and causes students to be challenged and excited about learning.

Instructors who excel in the teaching of young people should be selected as the instructional experts for the Institute. Characteristics of good instructors include:

* The ability to demonstrate empathy.

* A thorough knowledge of the topics to be taught.

* Being capable of using a variety of proven learning methods.

* Being capable of adjusting the curriculum content to the individual.

Volunteer Community Participants-

A technical institute is enhanced by the participation of community business and agency volunteers as demonstrators, as leaders in discussions of barriers for females in certain occupations, and as technical experts for laboratory hands-on activities. Tips for selection of these persons are included below:

Volunteer Presentors -- Young women enjoy demonstrations by agency or business volunteers when they are conducted properly. Break students into small groups that move from demonstrator to demonstrator throughout a facility. Communication between presentor and presentee in this way will be enhanced. This creates a more informal environment for open discussion and questioning.

If possible, preview potential speakers by observing them in action at an electronics or engineering day or other forums. If not, plan an informal interview. This will enable you to screen out as well as screen in your presentors. Role models must be chosen with care. They should reflect the values you wish presented and be able to effectively communicate with the participants.

Volunteer Speakers: One of the purposes of the Institute is to provide young women with a variety of role models from industry. Consider the following aspects when planning speakers:

a. *Content*: Content should be varied from speaker to speaker. Have an initial presentation on an educational topic such as back planning in production. Provide an opportunity in the open exchange time for more informal career and personal topics to be brought up. Discussion could focus on barriers faced by women in nontraditional careers, personal lifestyle with regards to their job, and the importance of math to their occupation. Inspirational kinds of topics offer encouragment for girls to keep trying.

b. *Setting*: Provide informal sessions rather than formal sessions. This creates an easy exchange for everyone. This can be done by:

    * Planning cookouts over an open fire that includes an informal talking time with industry women before or after dinner.

* Combining the role of speaker with roles of demonstrator or lab instructor for hands-on learning at the industry site.

* Encouraging participation by business women in the evening hall time get-togethers before bed check.

* Organizing informal environments outside under trees, during hikes, or in a room with big stuffed pillows or bean bags. Including food treats is also a good idea. The objective is to cause an environment for open two-way exchange of ideas rather than one of the business representative's "talking to" the students and the students merely sitting and receiving.

* Planning fun activities in diads and triads for the purpose of responding to a questionnaire, finding solutions to problems, creating a project or role playing. Involve participants in active rather than passive learning.

c. *Volunteers for one-on-one hands-on instruction:* Local businesses are normally pleased to be asked to assist as professional experts in a lab project. Men and women possessing expertise and a desire to work with youth are excellent resources.

Scheduling

The timing and scheduling of events can be one of the most important considerations in planning an institute. Students who are tired because bed check was scheduled too late will not be attentive the next day. Allowing too little or too much time for traveling or for the various learning activities will also depreciate educational results. Considerations for scheduling are:

* Schedule supervised free time. It is as important as instructional and recreation time.

* Space activities so there will be no need to rush from site to site.

* Schedule the instructional portion of the program early in the day. Students will tire as the day progresses.

* Schedule periodic breaks for recreation and refreshments.

* Schedule a variety of types of activities throughout the day. Alternating instruction, recreation and socialization, for example helps maintain participant interest and enthusiasm. When possible, integrate these activities in one setting, e.g. during a field trip to industry, combine a tour, with a lab (hands-on learning activity) experience, a picnic, recreation (volleyball in the industry recreational facilities), and informal sessions with business and industry models. This integration lessens feelings of segregation by types of experiences.

* Schedule early bed checks. (Ten thirty proved workable for both students and counselors in the pilot.)

* Schedule a complement of activities throughout the day and night so that students are occupied in productive activities.

* Do not over schedule or underschedule. Too many activities will result in overly tired participants. Too few could result in boredom or nonproductive pursuits.

* Be flexible with the schedule. Use it as a guide. Allow for unexpected conditions or participant's requests.

Health and Safety Issues

You serve in lieu of parents for the students under your care. This carries with it a legal responsibility to exercise reasonable control and supervision. It dictates implementation of procedures that will protect you and your institution. Legal issues must be addressed to ensure the health and safety of all individuals participating in the project.

Health-

Insurance: Insurance can usually be obtained through your sponsoring institution at a minimal cost. For approximately $2.50 per person per week, a $5,000 coverage can be obtained for both students and counselors.

Health Records: Obtain signed medical records from a physician or registered nurse for all students before entrance into the program. This is your record of prior medical problems. This precludes claims for health related problems that existed before operation of the Institute. It also provides you with a means of identifying those students who have a particular medical problem.

Present each instructor or supervisor in the program with a complete list of names of students and their medical problems. Included might be:

a. Allergies
b. Heart irregularities
c. Diabetes
d. Asthma

First Aid: A complete first aid kit should be on hand at all times.

Safety-

A plan for the supervision of every activity (day and night) should be devised. Following are some items to consider:

* Shopping outings can be scheduled for a mall (enclosed area) rather than in an area difficult to supervise.

* A minimum of release time to roam the campus or go shopping should be given. (It only takes a minute for a student to enter a car or join someone on a motorcycle.)

* Plan supervised release times.

* Conduct bed checks each evening.

* Keep the supervisor per student ratio high for field trip excursions and when designating counselor assignments.

PROTECT YOURSELF AND YOUR INSTITUTION ON SAFETY AND HEALTH MATTERS BY OBTAINING A SIGNED PARENTAL RELEASE FORM.

Conclusion

Summer Technical Institutes are but one way to impact job stereotyping. This method has been proven to be effective in altering career perceptions and behaviors of young women, as evidenced by evaluations of the impact. Young women, as well as men, need to acquire the skills necessary for our complex society. Young girls must perceive their world as full of options with a future they can create.

*For comments or project assistance, call (602) 523-5442 or 800-522-2283 in Arizona, Beth Packard, at the Arizona Center for Vocational Edcuation of Northern Arizona University. Information about similar projects in other states or those originating as a result of this publication will be appreciated.

REFERENCES

Armstrong, J.M. (1981). Achievement and participation of women in mathematics: Results of two national surveys. Journal of Research in Mathematics Education, 12 (5), 356-372.

Bandura, A. and Walters, R.H. (1963). Social Learning and Personality Development. New York: Holt, Reinhart and Winston.

Basta, N. (1986). Targeting emerging industries [Special Issue]. Business Week's Guide to Careers, 11.

Bloom, B. S. (1980, February). The new direction in educational research: Alternative variables, Phi Delta Kappan, pp. 383-385.

Campbell, P. B. (1986, March). What's a nice girl like you doing in a math class? Phi Delta Kappan, pp. 516-519.

Clifford, M.M. (1981). Practicing Educational Psychology Boston; Houghton Mifflin Company.

Dugger, D. (1986, Winter). Research related to girls and math. Title IX Line, Center for Sex Equity in Schools, University of Michigan, 6 (1) pp. 4-5.

Dweck, C.S. and Bush, E.G. (1976). Sex differences in learned helplessness: Differential debilitation with peer and adult evaluators. Developmental Psychology, 12, 147-156.

Garfield-Scott, L. and LeMahieu, P. (1981, December). Targeting nontraditional students: A study of change process in vocational education. The Vocational Guidance Quarterly, 33 (2) 157-165.

Gill, R., (1985). Status Report on Male and Female Students in Arizona Vocational Education, Arizona Department of Education.

Staff. (1984, December 23). Jobs of the future [Special Issue]. U.S. News and World Report, pp. 40-45.

Staff. (1985, November 25). The profession. Electronic Engineering Times, p. 81.

Kolde, R.F. (1985) Women in the labor force. Vocational Education Journal, American Vocational Association, Inc., 60 L(7), 22-25.

Maier, S.F., Seligman, M., and Solomon, R.L. (1986). Punishment and Aversive Behavior. New York; Appleton-Century-Crofts, 299-342.

Megdal, S. and Tobias, S. (1986). An economist and a feminist look at comparable worth. Arizona Business, pp. 16-22.

Mitchell, R. (1986, Spring). Job outlook for new grads [Special Issue]. Business Week's Guide to Careers, 11.

Moody, C. D., Sr. (1986, Winter). Fostering sex equity in math. Title IX Line, Center for Sex Equity in Schools, University of Michigan, 6 (1), p. 1.

Moore and Smith. (1983, Winter). Coursework...; Pallas and Alexander, Reply to Benbow and Stanley, American Educational Research Journal, 475-477.

Packard, E. A. (1986). Women and full citizenship. Arizona Humanities Association Journal, 6, (4), 50-52.

Truxal, J. G. (1984, March). Seeing the applications makes science exciting. Vocational Education Journal, American Vocational Association, Inc., 59 (2), 24-26.

Staff. (1985, December). Wanted: Women entrepreneurs for high-tech opportunities. Working Woman, pp. 37-39.

SUMMER TECHNICAL INSTITUTE PROGRAM DESIGN

UNIT	PROJECTS	RELATED INFORMATION	INSTRUCTIONAL ACTIVITIES	SPECIAL ACTIVITIES
1. Production Processes	Electronic Assembly	Characteristics of Solder	Tour of the Engineering College	Practice Soldering on a Circuit Board
		Function of electronic schematics		Identify electronic components & schematic symbols.
		Basic radio theory	Tour Comtec Economation for electronics application	Students assemble a transitor radio
		Quality of assembled circuit board		Students inspect solder & check for short circuits
		The need for alignment		Performance of alignment operation
		AM antennas & reception	Students will evaluate their product & review learning	Testing of radios
	Other types of assembly, mechanical/medical products, etc..	Knowledge of production processes	Hughes Aircraft lesson on back planning	Tour technical & non-technical firms to view production processes
			W.L. Gore Medical Products presentation of engineering design model	University Physical Therapy & Health Dept. demonstration on medical technology
			Tour Mack Corporation robotic parts production and assembly	
		Mechanical measurements in quality control	Measure & read vernier caliper	An instructional sheet will be provided

UNIT	PROJECT	RELATED INFORMATION	INSTRUCTIONAL ACTIVITIES	SPECIAL ACTIVITIES
			Measure thickness of a gage block, a metal sheet	Students given the gage, specimens & directions.
			Measure with an engineer's scale	Students provided with scale & assigned measurements
			Make measurements with an architect's scale	Students provided with blueprint for checking dimensions and scale
2. Career Decisions	Provide female role models throughout all facets of the institute	Women can succeed in Math dependent fields	Speakers present personal success stories with math & importance of math explained	Women will be used as instructors, counselors, guides, and presentors
		Sex barriers to non-traditional careers can be overcome	Role models present barriers to nontraditional careers	Participants will view women in non-traditional jobs & talk to them
			The local sex equity specialist will present a participatory activity to emphasize the problem	
	Complete interest inventory	There are many job possibilities	Use the Hollands & GIS Computer system to explore jobs Speakers tell about jobs	
		Discover avenues for exploring interests	Tour a variety of businesses & determine interest areas	
	Explore jobs in technology	Knowledge of levels of technical jobs	Tour a university career resource center	See Films, use resource materials
		Knowledge of technology in all fields of study	View women in technology and businesses	Print a hard copy of career possibilities jobs, schools, etc..

UNIT	PROJECT	RELATED INFORMATION	INSTRUCTIONAL ACTIVITIES	SPECIAL ACTIVITIES
			Spend an evening in the university's career development office using resources to explore interests	
		Discover means for developing skills	Use the computer information system to locate educational institutions and employers	
	Clarify values as they relate to job choices and lifestyle	Everyone has values. How do we identify them and use them for life planning?	Two films on sex role stereotyping will be shown by counselors. Discussion will follow Student will play values auction	
3. Computer LAB	Write computer programs and solve problems on the IBM personal computers	Algorithms-solution design	Women from Garrett & Sperry Industries will demonstrate concepts on the computer	Learning system commands to communicate with the computer. Learn basic statements "LET", "PRINT"
		Learn how to read flow charts	Tour the Geological Survey to demonstrate computer use in science	How to operate user friendly programs & Learn arithmetic operations
		Keyboard typing skills	Tour the Computer Science Department at N.A.U. for demonstration of computers in education	Learn loops & "GO TO" statement Learn decision making techniques with "IF-THEN" statements. Self-evaluations & discussion

SUMMER TECHNICAL INSTITUTE ACTIVITY SCHEDULE

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	Breakfast 6:30-7:15	Breakfast 6:30-7:15	Breakfast 6:30-7:15	Breakfast 6:30-7:15	Breakfast 6:30-7:15	Breakfast 6:30-7:15
	Computers 7:30-9:00	Computers 7:30-9:00	Computers 7:30-9:00	Computers 7:30-9:00	Computers 7:30-9:00	Clean Dorms and Pack 7:15-8:15
	Bus to Tech. Restroom Break 9:00-9:15	Bus to Tech. Restroom Break 9:00-9:15	Bus to Tech. Restroom Brk 9:00-9:15	Bus to Tech. Restroom Break 9:00 - 9:15	Bus to Tech. Restroom Break 9:00-9:15	
	Hughes Aircraft 9:15-10:00	Sperry-Week 1 Motorola-Wk 2 9:15-9:45	W. L. Gore 9:15-10:00	Presentation 9:15 -10:00	Mechanical Measurements 9:15-10:00	Final Goodbyes Skits 9:00-10:00
	Instruction & Soldering 10:00-11:30	Soldering & Schmatics 9:45-11:00	Radio Assembly 10:00-11:30	Radio Assembly 10:00-11:30	Evaluations Presentation of Projects 10:00-11:00	Free to go Home...
	Supervised Break 11:30-12:30	Supervised Break 11:00-12:00	Supervised Break 11:30-12:30	Supervised Break 11:30-12:00	Supervised Break 11:00-11:30	LUNCH FOR THOSE WHO WANT IT 12:00
Check-In 2:00-4:00	LUNCH 12:30-1:00	Mack Corp. Tour 12:00-1:00	LUNCH 12:30-1:00	LUNCH 12:00-1:00	OAK CREEK CANYON Outing 11:30-6:00	
Engineering Electronics Introduction 5:00-6:00	Geological Survey Tour 1:30-3:00	Picnic at Sunset Crater 1:00-2:00	Comtec Econ. Pepsi Tour 1:00-3:00	Engineering College Tour 1:00-3:00		
Dinner Introduction 6:00-7:00	Buffalo Park Walk 3:00-6:00	Seismograph Demonstration 2:00-3:00	Swimming at N.A.U. 3:30-6:00	Shopping 3:30-6:00	Barbeque and Graduation 6:00-7:00	
Counselors 7:00-9:00	Dinner 6:00-6:30	Monument Tour 3:30-6:00	Dinner 6:00-6:30	Dinner 6:00-6:30		
Room Check 10:45	Career Develop. Wrap-up and Fun Activities 6:30-9:50	Cookout and meet Industry Models-Inform. 6:00-9:50	Career Devel. Sex-Role Stereotyping 6:30-9:50	Office of Career Devel. Hands-on Tour 6:30-9:50	Supervised Student Free-Time 7:00-10:30	
	Room Check 10:45	Room Check 10:45	Room Check 10:45	Room Check 10:45	Room Check 10:45	

COMMENTS OF YOUNG WOMEN IN RESPONSE TO:
"WHAT DID YOU LEARN THIS WEEK
AT SUMMER TECHNICAL INSTITUTE?"

•

I learned to be friends with people
I never thought I'd be friends with—
because of ethnic things—and that
people are people.

•

No matter who you are you can do
anything you want—no matter
what kind of background you come from.

•

That a woman can do anything she
wants—and it's not just a man's field.

•

I learned what field to go into after
high school or college and that I can
do what I want—and that's engineering.